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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/519,573

12/30/2004

Masahiko Mitsui

77792/46

8973

23838 7590 06/03/2008

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EXAMINER

PIGGUSH, AARON C

ART UNIT

PAPER NUMBER

2838

MAIL DATE

DELIVERY MODE

06/03/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/519,573	MITSUI ET AL.	
	Examiner	Art Unit	
	Aaron Piggush	2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 9-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 9-14 and 16-19 is/are rejected.
- 7) ☒ Claim(s) 15 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-6, 9-11, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Watanabe (US 6,258,163).

With respect to claims 1 and 2, Watanabe discloses a battery state-of-charge estimator comprising: a voltage detector unit which detects a voltage of a battery (no. 12 in Fig. 1 and abstract); an internal resistance estimator unit which estimates an internal resistance of the battery (col 2 ln 36-40, abstract, col 3 ln 36-40, and no. 44 in Fig. 9); an estimated charging/discharging current calculator unit which calculates an estimated charging/discharging current of the battery based on the internal resistance of the battery determined by the internal resistance estimator unit, the voltage of the battery, and an open voltage of the battery (abstract, col 2 ln 53-67, and Fig. 10); an SOC estimator unit which estimates a state of charge of the battery based on the estimated charging/discharging current determined by the estimated charging/discharging current calculator unit (col 3 ln 23-37, abstract, and Fig. 2); and an open voltage calculator unit which sets the detected voltage of the battery as the open voltage of the battery at an initial calculation of the charging/discharging current and, after the initial calculation, calculates the open voltage of the battery based on the SOC which is previously estimated (col 3 ln 23-37, abstract, and col 4 ln 26-42).

Furthermore, please note that the charging/discharging current of the battery will always be “based” on the internal resistance of the battery because the internal resistance of the battery directly affects the current into/out of the battery (as noted by the equation of col 4: $V_r = -r \cdot I_b$). Please also note that the SOC and battery voltage are directly related to one another, wherein the battery voltage can be interpreted as an SOC of the battery when compared to the optimum potential voltage level of the battery.

With respect to claims 3 and 5, Watanabe discloses the battery SOC estimator further comprising: a temperature detector unit which detects a temperature of the battery (no. 30 in Fig. 3); wherein the internal resistance estimator unit estimates the internal resistance based on the temperature of the battery (col 6 ln 55 to col 7 ln 15 and col 3 ln 7-13).

Additionally, it should be noted that it is also implied that the internal resistance is based off of the temperature of the battery, since the temperature affects the battery in the sense that as the temperature decreases, the internal resistance of the battery increases (e.g. harder to start a vehicle battery in cold weather).

With respect to claims 4 and 6, Watanabe discloses a current detector (no. 10 in Fig. 3 and 9), internal resistance calculator and internal resistance corrector (no. 44 Fig. 9, abstract, col 2 ln 35-40, and col 3 ln 30-43). Please also see the rejection of claims 2 and 3 above.

With respect to claims 9 and 18, Watanabe discloses wherein the temperature detector unit is placed in the battery, on a surface of the battery, or near the surface of the battery (implied since the temperature sensor must meet at least one of those requirements in order to actually sense the battery temperature). Also see the rejection of claim 3 above.

With respect to claim 10, Watanabe discloses wherein the SOC estimator unit periodically estimates the SOC at a predetermined interval (Fig. 2 and 8 and abstract).

With respect to claim 11, Watanabe discloses the SOC estimator further comprising: a current detector (no. 10 in Fig. 3); a first battery full-capacity calculator unit which determines a full capacity of the battery based on the SOC which is estimated by the SOC estimator unit and an integrated value of the charging/discharging current of the battery (S2-S4 in Fig. 2, abstract, and “battery model” section of Fig. 3); and a second SOC estimator unit which estimates a state of charge of the battery based on the full capacity of the battery (S7 in Fig. 2, no. 26 in Fig. 3, and abstract). Please also note col 6 ln 1-53 for a more detailed description of Fig. 2.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 12, 14, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US 6,258,163).

With respect to claim 12, Watanabe does not expressly disclose a battery state-of-charge estimator further comprising: a second battery full-capacity calculator unit. Additionally, although Watanabe discloses a second SOC estimator unit (as noted in the rejection of claim 11 above), it does not estimate a SOC of the battery based on the full capacity of the battery

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obtained by a second battery full-capacity calculator unit (Watanabe's SOC is still based on the full capacity obtained by the first battery full-capacity calculator unit).

It has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

At the time of invention, it would have been obvious to a person of ordinary skill to include a second battery full-capacity calculator unit in the device of Watanabe, so that an accurate reading can be attained even if the first battery full-capacity calculator unit malfunctions.

Additionally, please point out in the applicant's drawings where the second battery full-capacity calculator unit is located. It is assumed that the device is located in the ECU 14; however, the specification seems to only mention that the first battery full-capacity calculator unit is located there.

With respect to claim 14, Watanabe discloses the battery state-of-charge estimator, wherein the estimated charging/discharging current calculator unit calculates the estimated charging/discharging current of the battery based on the internal resistance of the battery, the voltage of the battery, the open voltage of the battery, and a polarization voltage (abstract, col 2 ln 12-40 and 53-67, and Fig. 10).

However, Watanabe does not expressly disclose a first or second charging/discharging current calculator unit in addition to the estimated charging/discharging current calculator unit. Although, it should be noted that only one of the three units is required by the claim language.

It has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

At the time of invention, it would have been obvious to a person of ordinary skill to include multiple charging/discharging current calculator units in the device of Watanabe, so that an accurate reading can be attained even if one of the charging/discharging units malfunctions.

With respect to claim 16, Watanabe discloses the battery state-of-charge estimator wherein in consideration of an environmental temperature of the battery (col 3 ln 7-13 and col 7 ln 6-14), one of the measured charging/discharging current value detected by a current detector unit (no. 10 in Fig. 1 and 3) and the estimated charging/discharging current determined by the estimated charging/discharging current calculator unit (col 2 ln 53-67, Fig. 10, and abstract) or the first/second charging/discharging current unit is selected and the SOC is estimated based on the selected charging/discharging current value (col 3 ln 23-37, abstract, and Fig. 2).

Please note that the addition of a first and second charging/discharging current unit was already addressed in the rejection of claim 14 above. Additionally, the term “in consideration” is vague, wherein it is clear that temperature always affects the battery, and this effect will implicitly be taken “into consideration” when measurements are carried out.

With respect to claim 19, Watanabe discloses the battery state-of-charge estimator, wherein the SOC estimator unit or second SOC estimator unit periodically estimates the SOC at a predetermined interval (col 3 ln 23-37, abstract, Fig. 2, and no. 26 in Fig. 3).

However, Watanabe does not expressly disclose wherein there is a third SOC estimator unit. Although, it should be noted that the claim language only requires one of the units.

It has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

At the time of invention, it would have been obvious to a person of ordinary skill to include multiple SOC estimator units in the device of Watanabe, so that an accurate reading can be attained even if one of the estimator units malfunctions.

5. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US 6,258,163) in view of Sakai (US 6,608,482).

With respect to claim 13, Watanabe does not disclose wherein a remaining capacity detector unit detects a remaining capacity of each individual cell within the battery or a remaining energy calculator unit which detects a minimum remaining capacity based on the remaining capacity of each individual cell.

Sakai discloses wherein a remaining capacity detector unit detects a remaining capacity of each individual cell within the battery (col 6 ln 3-9) and wherein a remaining energy calculator unit which detects a minimum remaining capacity based on the remaining capacity of each individual cell (Fig. 4, abstract, and col 1 ln 61 to col 2 ln 21), in order to take all the cells of the battery into account (which gives a more accurate representation of the SOC).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include a remaining capacity detector unit and a remaining energy calculator unit (as mentioned above) in the device of Watanabe, as did Sakai, so that a more accurate reading for the state of charge could be presented, which would include the effects of uneven degradation of individual battery cells.

6. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US 6,258,163) in view of Cherng (US 5,656,920).

With respect to claim 17, Watanabe does not expressly disclose a charging/discharging prohibiting unit which prohibits charging and discharging of the battery when the charging/discharging current of the battery considering the polarization voltage exceeds a predetermined value.

Cherng discloses a charging/discharging prohibiting unit which prohibits charging and discharging of the battery when the charging/discharging current of the battery exceeds a predetermined value (col 1 ln 52-58, col 4 ln 17-26, col 13 ln 66 to col 14 ln 9, and col 16 6-15), in order to help prevent charging the battery at too high of a current which could otherwise damage a battery (especially when it is at a low SOC or a low temperature).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include a charging/discharging prohibiting unit in the device of Watanabe, as did Cherng, so that the circuit could prevent charging the battery at too high of a current which could otherwise damage a battery (especially when it is at a low SOC or a low temperature).

Allowable Subject Matter

7. Claim 15 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Furthermore, the claim language should also be checked over wherein there is at least one mistake concerning a lack of antecedent basis (line 3 of claim 15 recites "...the current detector" even though there is no previous mention of a current detector in the claims from which claim 15 depends).

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Claim 15 recites the battery state-of-charge estimator according to claim 14, further comprising: a current detection abnormality detector unit which compares the measured charging/discharging current value which is detected by a current detector and the estimated charging/discharging current value which is determined by one of the estimated charging/discharging current calculator unit, the first or the second charging/discharging current calculator unit, and determines the current detector unit is abnormal when a difference between the current values is greater than a predetermined difference and that the current detector unit is normal when the difference is a predetermined value or smaller, wherein the SOC is estimated based on the estimated charging/discharging current value when the current abnormality detector unit determines that the current detector unit is abnormal and the SOC is estimated using the measured charging/discharging current value when the current detection abnormality detector unit determines that the current detector unit is normal.

The prior art of record does not disclose the above limitations, nor would it be obvious to modify the art in such a manner.

Response to Arguments

8. Applicant's arguments filed February 20, 2008 have been fully considered but they are not persuasive.

With respect to claims 1, 2, and 6, applicant argues that Watanabe does not teach or suggest the following elements: an SOC estimator unit which estimates a state of charge SOC of the battery **based on the estimated charging/discharging current determined by the estimated charging/discharging current calculator unit** and an open voltage calculator unit

which **sets the measured voltage of the battery as the open voltage of the battery at an initial calculation of the charging/discharging current** and, after the initial calculation, calculates the open voltage of the battery based on the SOC which is previously estimated. Applicant further explains that the advantages of certain embodiments of the present invention are not realized by Watanabe.

Examiner respectfully disagrees for the following reasons: Watanabe meets the above mentioned claim language in col 3 ln 23-40, abstract, and Fig. 2, amongst other places throughout his specification. Those citations show that Watanabe uses or calculates an internal resistance, measured/detected current, battery voltage, open voltage, and SOC in his invention to estimate the charge state and degradation state of the battery. In response to applicant's argument that his application has additional advantages, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Furthermore, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Concerning the additional explanations of the applicant's own Fig. 3 (including the equations listed on page 10 of the Arguments/Remarks made by the applicant), it is noted that the features upon which applicant relies (i.e., Fig. 3 of the instant application) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26

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USPQ2d 1057 (Fed. Cir. 1993). To clarify, the claim language presented by the applicant is still met by Watanabe (as noted by the citations presented in the rejection above), regardless of the equations that the applicant cites from the instant application's specification. Lastly, the terms “based on” and “in consideration” are vague/general and indefinite terms which are interpreted in the broadest reasonable sense.

Conclusion

9. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron Piggush whose telephone number is (571)272-5978. The examiner can normally be reached on Monday-Friday 9:30am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Akm Ullah can be reached on 571-272-2361. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Adolf Berhane/
Adolf Berhane
Primary Examiner
Art Unit 2838

/A. P./